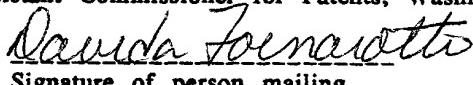


524 Rec'd PCT/PTO 05 OCT 1999

FORM PTO-130 (REV 10-94)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		RCA 88482	
INTERNATIONAL APPLICATION NO PCT/US97/17033		INTERNATIONAL FILING DATE 23 September 1997 (09.23.97)	PRIORITY DATE CLAIMED 14 April 1997 (14.04.97)
U.S. APPLICATION NO. (IF KNOWN, SEE 37 C.F.R. 1.5) 09/402498			
TITLE OF INVENTION SYSTEM FOR FORMING PROGRAM GUIDE INFORMATION FOR USER INITIATION OF CONTROL AND COMMUNICATION FUNCTIONS			
APPLICANT(S) FOR DO/EO/US James Edwin Hailey, Michael Wayne Johnson, Hugh Boyd Morrison, Robert Joseph Logan, Robert Skipworth Comer, Sheila Renee			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information CROSBY			
<ol style="list-style-type: none"><input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.<input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.<input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).<input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.<input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))<ol style="list-style-type: none"><input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).<input checked="" type="checkbox"/> has been transmitted by the International Bureau.<input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).<input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).<input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))<ol style="list-style-type: none"><input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).<input type="checkbox"/> have been transmitted by the International Bureau.<input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.<input checked="" type="checkbox"/> have not been made and will not be made.<input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).<input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).<input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).			
Items 11. to 16. below concern document(s) or information included:			
<ol style="list-style-type: none"><input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98, with references attached.<input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.<input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.<input type="checkbox"/> A substitute specification.<input type="checkbox"/> A change of power of attorney and/or address letter.<input type="checkbox"/> Other items or information:			
CERTIFICATE OF MAILING UNDER 37 CFR 1.10			
<u>EJ648050299US</u> "Express Mail" mailing no.		<u>October 5, 1999</u> Date of Deposit	
I hereby certify that this application is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.			
Davida Fornarotto Typed or printed name of person mailing application		 Signature of person mailing application	

420 Rec'd PCT/PTO 05 OCT 1999

S APPLICATION NO. (International) 09/402498		INTERNATIONAL APPLICATION NO PCT/US97/17033	ATTORNEY'S DOCKET NUMBER RCA 88482
17 <input checked="" type="checkbox"/> The following fees are submitted:		CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO.		\$ 840.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) \$ 670.00			
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)). \$ 760.00			
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... \$ 970.00			
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4). \$ 96.00			
ENTER APPROPRIATE BASIC FEE AMOUNT =		\$ 970.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	26 -20 =	6	x 18.00 \$ 108.00
Independent claims	3 -3 =	0	x 78.00 \$ 0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		+ 260.00 \$	
TOTAL OF ABOVE CALCULATIONS =		\$ 1078.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).		\$	
SUBTOTAL =		\$ 1078.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).		\$	
TOTAL NATIONAL FEE =		\$ 1078.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property		+ \$ 40.00	
TOTAL FEES ENCLOSED =		\$ 1118.00	
		Amount to be: refunded \$ charged \$	1118.00
a. <input type="checkbox"/> A check in the amount of \$ _____ to cover the above fees is enclosed.			
b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. 07-0832 in the amount of \$ 1118.00 to cover the above fees. A duplicate copy of this sheet is enclosed.			
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-0832. A duplicate copy of this sheet is enclosed.			
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.			
 SIGNATURE <u>Alexander J. Burke</u> NAME			
SEND ALL CORRESPONDENCE TO Mr. Joseph S. Tripoli THOMSON MULTIMEDIA LICENSING INC. PO Box 5312 Two Independence Way Princeton, New Jersey 08543			
40,425 07-0832 REGISTRATION NUMBER			

420 Rec'd PCT/PTO 05 OCT 1999

U.S. APPLICATION NO. 09/402498		INTERNATIONAL APPLICATION NO PCT/US97/17033	ATTORNEY'S DOCKET NUMBER RCA 88482																																																								
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423 Recd PCT/PTO 35 OCT 1999

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : James Edwin Hailey, Michael Wayne Johnson,
Hugh Boyd Morrison, Robert Joseph Logan,
Robert Shipworth Comer and Sheila Renee Crosby

Filed : Herewith

For : SYSTEM FOR FORMING PROGRAM GUIDE
INFORMATION FOR USER INITIATION OF
CONTROL AND COMMUNICATION FUNCTIONS

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

In the US national phase application of PCT/US97/17033 filed herewith, please enter the following amendments.

IN THE ABSTRACT:

✓ Please add the attached Abstract.

REMARKS

To meet the requirements of the United States, the Abstract (as originally filed in the PCT application) is added. Reference indicia has also been deleted.

No fee is believed to have been incurred by virtue of this amendment. However if a fee is incurred on the basis of this amendment, please charge such fee against deposit account 07-0832

Respectfully submitted,
James Edwin Hailey
Michael Wayne Johnson
Hugh Boyd Morrison
Robert Joseph Logan
Robert Shipworth Comer
Sheila Renee Crosby

Alexander J. Burke Oct 30 1999
Alexander J. Burke, Attorney
Registration No. 40,425
609/734-9503

THOMSON multimedia Licensing Inc.
Patent Operation
PO Box 5312
Princeton, NJ 08543-5312

Date: OCT 30 1999

ABSTRACT

A video decoder system provides a Program Guide User interface for User operation of functions including Email, telephone, Internet access, fax, 5 home control, and video-phone functions. A method for forming a program guide allowing a User to select a function involves receiving program guide information for display from at least one source. The program guide information including User selectable menu options is formatted for display. Access data retrieved from memory enables initiation of communication between the decoder and a 10 device external to the decoder in response to User selection of a displayed program guide menu option. Program map information is generated that associates a displayed User selectable menu option with access data that enables initiation of communication between the decoder and the external device. Also, the decoder may generate User selectable menu options for display 15 in the program guide.

10 Rec'd PCT/PTO 05 OCT 1999

System for Forming Program Guide Information for User Initiation of Control and Communication Functions

5 This is a non-provisional application of provisional application serial No. 60/043,539 by R. J. Logan et al, filed 14 April 1997.

Field of the Invention

10 This invention is related to the field of digital signal processing, and more particularly to the acquisition, formation and processing of Program Guide Information, and program content data, derived from multiple sources, e.g. Internet, cable, satellite and terrestrial sources.

15

Background of the Invention

Home entertainment systems which combine Personal Computer and television functions (PC/TV systems), are 20 increasingly becoming, generic, User interactive, multiple source and multiple destination communication devices. Such systems are required to communicate in different data formats between multiple locations for a variety of applications in response to User requests. For example, a PC/TV system may receive data from 25 satellite or terrestrial sources comprising High Definition Television (HDTV) broadcasts, Multi-point Microwave Distribution System (MMDS) broadcasts and Digital Video Broadcasts (DVB). A PC/TV system may also receive and transmit data via telephone (e.g. the Internet) and coaxial lines (e.g. cable TV) and from both 30 remote and local sources such as Digital Video Disk (DVD), CDROM, VHS and Digital VHS (DVHS™) type players, PCs, and many other types of sources.

A number of problems arise in developing such a generic PC/TV entertainment system. Specifically, problems arise 35 in supporting communication between multiple data sources and in processing data from the multiple sources. A problem is also

presented by the need to devise a User interface for such a system that supports complex User interactive tasks whilst providing a simple command interface suitable for the general public. A PC/TV system User interface, for example, should allow a User to view a selected program and permit User operation of functions such as Email, telephone, Internet access, fax and video-phone functions. Such applications require communication between a PC/TV unit and a variety of both remote sources e.g. a satellite service provider, and local sources e.g. a DVD storage device. Further, a PC/TV needs to process and decode data in different data formats from different devices and display received data to the User. These problems are addressed by a system according to the present invention.

Prior art references include WO97/13368 which discloses a program guide processing system involving using remote databases in acquiring program guide information from data sources in response to user command. Further, the prior art references also include the article "Intercast Brings the Web to TV", January 21, 1997 PC magazine, which discloses a system for conveying a program guide in the Vertical Blanking Interval of an analogue TV signal.

Summary of the Invention

The inventors have hereby recognized that a Program Guide type of User interface advantageously provides a simple, easy to use interface for User operation of functions such as Email, telephone, Internet access, fax, home control, and video-phone functions. The use of a Program Guide for such functions also advantageously provides a single User interface for User operation of multiple devices and associated functions.

-The inventors have further recognized that it is desirable for a video decoder system to be capable of generating and maintaining a database of information to support User selected functions. Such a database provides a program map that associates 5 program guide menu functions with required communication protocols and access data involved in data transfer between a PC/TV unit and a variety of both local and remote information sources.

A disclosed video decoder system provides a Program Guide User interface for User operation of communication and control 10 functions. A method for forming a program guide allowing a User to select a function involves receiving program guide information for display from at least one source. The program

guide information including User selectable menu options is formatted for display. Access data retrieved from memory enables initiation of communication between the decoder and a device external to the decoder in response to User selection of a 5 displayed program guide menu option. Program map information is generated that associates a displayed User selectable menu option with access data that enables initiation of communication between the decoder and the external device.

In a feature of the invention, the decoder generates 10 the User selectable menu option for display in the displayed program guide.

Brief Description of the Drawings

15 In the drawing:

Figure 1 shows a home entertainment decoder system, according to the invention, for communicating with a plurality of sources and for processing program guide information and program content data.

20

Figure 2 shows an exemplary Program Guide display format according to the invention.

Figure 3 shows a data format, according to the 25 invention, for packetizing Internet data for transmission within an MPEG compatible datastream.

Figure 4 shows a flowchart, according to the invention, for receiving program guide information including User selection 30 options and processing the received information to form a program guide supporting User selectable communication functions.

Figure 5 shows a flowchart, according to the invention, 35 for a process to form a program guide in a video decoder from information received from a plurality of sources.

Figure 6 shows a flowchart, according to the invention, for a process to automatically acquire and collate program guide information from a plurality of sources and to form a program 5 guide for display.

Figure 7 shows a black and white representation of an exemplary color Program Guide display format, according to the invention, showing menu options permitting a User to collate 10 programs by source and color attribute.

Figure 8 shows a flowchart, according to the invention, for a process to acquire information requested by a video receiver User via a selection made from options on a displayed program 15 guide.

Figure 9 shows a flowchart, according to the invention, for a process to decode input Internet information and compressed video data and to form a composite video output for 20 display.

Detailed Description of the Drawings

Figure 1 shows a home entertainment decoder system, 25 according to the invention, for communicating with multiple sources to acquire program guide information and program content data. The decoder system forms a program guide for display from information acquired and collated automatically from multiple sources. A User may initiate Email, telephone, Internet 30 access, fax and video-phone functions via selection of options from the displayed program guide. The decoder system adaptively decodes a datastream encoded to the MPEG standard incorporating compressed program content data and Internet data representative of, for example, Hypertext Mark-up Language 35 (HTML). The decoded data is formatted either as a composite video image or as separate video images for display.

The MPEG2 (Moving Pictures Expert Group) image encoding standard, hereinafter referred to as the "MPEG standard" is comprised of a system encoding section (ISO/IEC 13818-1, 10th June 1994) and a video encoding section (ISO/IEC 13818-2, 20th 5 January 1995), hereinafter referred to as the "MPEG systems standard" and "MPEG video standard" respectively.

Although the disclosed system is described in the context of a system for receiving an MPEG compatible signal, it is exemplary only. The principles of the invention may be applied to 10 systems in which the types of transmission channels and communication protocols may vary, or to systems in which the coding type may vary. Such systems may include, for example, non-MPEG compatible systems, involving other types of encoded datastreams and other methods of conveying Program Guide 15 information. Further, although the disclosed system is described as processing broadcast programs, this is exemplary only. The term 'program' is used to represent any form of data such as telephone messages, computer programs, Internet data or other communications, for example.

20 In overview, in the video receiver system of Figure 1, a carrier modulated with video data is received from a broadcast satellite by antenna 10 and processed by unit 15. The resultant digital output signal is demodulated by demodulator 20 and decoded and error corrected by decoder 30. In this exemplary 25 embodiment, the demodulated and decoded output from unit 30 is in the form of an MPEG compatible transport stream containing MPEG compressed video data and Internet data encoded in HTML. Video data encoded to the MPEG standard is in the form of a packetized datastream which typically includes the data content of 30 many program channels (e.g. content corresponding to cable television channels 1-125).

The MPEG compatible transport stream is provided to processor 25 which is responsive to commands from remote control unit 125. Processor 25 communicates with other data 35 sources including storage device 90 and either Internet data server 83 or Internet connection service 87 (e.g. America On-

line™). Program guide information is acquired and collated automatically from the input transport stream and storage device 90 and either server 83 or connection service 87. The acquired information is merged by processor 25 to form a program guide 5 for display incorporating selection options allowing a User to initiate Email, telephone, Internet access, fax and video-phone functions among others, for example. The program guide for display is also formed to include non-displayed information from multiple sources for identifying and assembling individual data 10 packets that constitute the programs that are selected for User viewing or listening. This information is used in recovering the content of selected programs from multiple sources.

Processor 25 adaptively decompresses the input compressed video data and decodes the HTML Internet data to 15 provide a formatted composite video image for display on unit 75. Processor 25 also provides encoded data outputs for storage on storage medium 105 via storage device 90, and provides encoded data to other devices (not shown to simplify drawing) via modem 80 and telephone lines.

20 A video receiver user initiates functions including Email, telephone, Internet access, fax and video-phone functions and viewing and storage of selected programs via selection of options from the displayed program guide. A User selects a displayed option with a cursor using remote control unit 125. 25 Commands from remote control 125 are passed via interface 120 to controller 115 within processor 25. Unit 115 controls the operation of the elements of processor 25 and responds to remote control unit 125 commands using a bi-directional data and control signal bus C. Controller 115 controls the functions of individual 30 elements within processor 25 by setting control register values within these elements with control bus C. Processor 25 also supports the storage and retrieval of data from storage medium 105 via storage device 90. Storage device 90 is a DVD type device and medium 105 comprises a multi-disk stack unit containing a 35 plurality of disks in this exemplary embodiment.

Considering Figure 1 in detail, a carrier modulated with video data received by antenna 10, is converted to digital form and processed by input processor 15. Processor 15 includes radio frequency (RF) tuner and intermediate frequency (IF) mixer 5 and amplification stages for down-converting the input video signal to a lower frequency band. Processor 15 also includes an analog to digital converter for digitizing the down-converted signal to produce a signal suitable for further processing. The resultant digital output signal is demodulated by demodulator 20 10 and decoded and error-corrected by decoder 30. The output from decoder 30 is further processed by unit 45 of processor 25.

The data provided to unit 45 is in the form of an MPEG compliant packetized transport datastream as defined in MPEG systems standard section 2.4 and includes program guide 15 information and the data content of one or more program channels. Processor 25 acquires and collates program guide information automatically from the input transport stream and storage device 90 and either Internet data server 83 or Internet connection service 87 (e.g. America On-lineTM). The individual 20 packets that comprise either particular program channel content, or Program Guide information, are identified by their Packet Identifiers (PIPs) contained within header information.

In response to control signal C, unit 45 selects either the transport stream from unit 30, or in a playback mode, a 25 datastream retrieved from storage device 90 via store interface 95. In normal, non-playback operation, individual packets that comprise program guide information are identified by unit 45 in the transport stream from unit 30 and assembled using PIPs that are predetermined and stored in internal memory of controller 30 115. Unit 45 matches the PIPs of incoming packets in the transport datastream from decoder 30 with PIP values pre-loaded in control registers within unit 45 by controller 115. Therefore, satellite broadcast program guide (SPG) information packets in the transport stream are identified by unit 45 without additional PIP 35 information. Controller 115 acquires a full SPG by accessing and

assembling the SPG packets that are identified and captured by unit 45.

The PID information that enables controller 115, in conjunction with unit 45, to identify data packets that comprise 5 individual programs is termed a program or channel map. The program map associates PIDs with individual packetized datastreams that constitute a program and is part of the SPG. The SPG may also contain additional information, e.g. packet assembly information, supporting the recovery of program guide data from 10 the input transport stream.

Controller 115 also configures unit 45 using Control signal C to select the data packets comprising the DVD program guide (DPG) information derived from DVD storage device 90 via interface 95. Unit 45 matches the PIDs of incoming packets in the 15 packet datastream from interface 95 with PID values pre-loaded in control registers within unit 45 by controller 115. Controller 115 acquires a full DPG by accessing and assembling the DPG packets that are identified and captured by unit 45.

A similar process is followed in acquiring Internet 20 program guide (IPG) information from Internet server 83 or from Internet connection service 87 by telephone line communication via modem 80. In acquiring the IPG, data identifiers analogous to or the same as the PIDs used in acquiring the SPG or DPG are matched with identifiers pre-loaded by controller 115. The 25 matching function may be performed either within unit 80 or by controller 115. The process for acquiring program guide information is explained in greater detail in the description of Figures 4-6.

The SPG, DPG and IPG information acquired by 30 controller 115 is merged by processor 25 to form a program guide for display incorporating selection options allowing a User to initiate Email, telephone, Internet access, fax and video-phone functions. In merging the data, the acquired SPG, DPG and IPG information is collated into two levels of hierarchy termed theme 35 and topic and redundant program guide information is eliminated. A theme, for example, may include categories such as movies,

sports, weather, arts, documentaries, news, etc. A topic is a category within a theme, for example, a movie theme category may have topics including, comedy, thriller, horror, science fiction, romance, adult entertainment, etc. Different or additional levels of 5 hierarchy may be used in collating the acquired SPG, DPG and IPG information involving criteria such as viewer age suitability, the period setting e.g. contemporary or historical, reviewer ratings etc.

A number of problems occur in collating the SPG, DPG and IPG information. The SPG, DPG and IPG information, being 10 from different sources, may categorize programs by different themes and topics and may use a different sorting hierarchy. Further, the SPG, DPG and IPG data may use conflicting, redundant or incompatible PIDs or other data identifiers for identifying individual data elements that comprise particular program 15 channel or guide content. Controller 115 creates a master set of themes and topics mapping the SPG, DPG and IPG information to a corresponding category in the master set. For example, the master set may contain an encompassing topic-theme of 'movies-comedy' to which is mapped both, a) the DPG topic-theme of 'movie- 20 parodies', and b) the IPG Internet topic-theme of 'movie-synopsis index' (an index of web pages). In collating the guide information, controller 115 determines the topic and theme categories of the data in the SPG, DPG and IPG from pre-determined theme-topic codes. The SPG, DPG and IPG theme and topic codes together with 25 equivalence mapping information for converting codes of one service provider, to those of another, are acquired from the SPG or User defined data input to processor 25 or are pre-stored in internal memory within controller 115. Controller 115 assembles the collated SPG, DPG and IPG packets according to the categories 30 defined by the master set of themes and topics. The assembled collated SPG, DPG and IPG data is stored by controller 115 in internal memory for use in forming a composite program guide for display.

Controller 115 also forms MPEG compatible non- 35 displayed information, associated with the displayed composite program guide. The non-displayed information includes composite

program map, conditional access and network information. This non-displayed information is required to support identification, assembly and decoding of the packets comprising the composite program guide and the associated program content. The 5 conditional access information governs access to programs based upon User entitlement. The network information defines physical network parameters such as satellite transmission channel frequencies and transponder channels, for example.

Controller 115 forms composite program map 10 information for the composite program guide that maps the SPG, DPG and IPG themes and topics to the master set of themes and topics. The composite program map also associates data identifiers (e.g. PID values) with individual packetized datastreams that constitute programs listed in the composite program guide. The 15 composite program map information may also include a dedicated indicator to denote that a particular program has associated Internet web page information available. In forming composite program map information, controller 115 examines the SPG, DPG and IPG information for data identifier omissions, redundancies 20 and conflicts. Controller 115 re-numbers existing data identifiers and creates new data identifiers as required to produce MPEG compatible program map information for both the collated program guide information and the associated program content.

Controller 115 also forms MPEG compatible conditional 25 access information and network information from corresponding information received in the SPG, DPG and IPG data. The conditional access information includes data such as encryption codes that govern access to programs that are dependent upon user entitlement. The network information defines physical network 30 parameters such as satellite transmission channel frequencies, transponder channels, and Internet access parameters associated with the composite program guide for display. The composite program map, conditional access and network information supports assembly, decoding and display of the program content 35 available from the satellite, storage and Internet server sources as well as the composite program guide.

Controller 115 also includes additional linking data in the non-displayed composite program map, conditional access and network information. The additional linking data supports the User selectable functions such as Email, telephone, Internet access, 5 fax, video-phone, channel tuning, program recording and home control functions. Home control functions may support User control of lighting air conditioning, heating and burglar alarm operation, for example. The additional linking data associates access data, both with data identifiers (e.g. PIDs) of requested 10 data, and with User selectable menu options in the displayed composite program guide. The access data includes identification codes, communication protocol codes, conditional access codes, Internet access codes e.g. URL codes for web page and Email access as well as telephone and fax numbers. The access data enables 15 processor 25 to communicate with external devices.

In order to generate the composite program guide for display, controller 115 retrieves the assembled and collated SPG, DPG and IPG packet data previously stored in internal memory. Controller 115 both converts the retrieved data to pixel data and 20 formats the converted data for storage in a pixel representative memory map contained in display processor 70. In addition, controller 115 creates User selectable menu options (for User selection of Email, fax etc.) in pixel data form for incorporation in the unit 70 pixel memory map. Controller 115 stores the 25 formatted SPG, DPG and IPG pixel data together with the generated option pixel data in the unit 70 pixel map to form the composite program guide for display.

The composite program guide, combining the SPG, DPG and IPG data and User selectable options, is formatted to be 30 compatible with the linking data in the non-displayed program guide information. For example, a User selectable option in the displayed guide (e.g. for a telephone function) is associated, both with access data for the function (e.g. a telephone number), and with data identifiers (e.g. PIDs for data packets of transmitted and 35 received telephone messages).

Display processor 70 converts the stored and formatted program guide data into conventional luminance and chrominance components. The luminance and chrominance components, together with timing data provided by controller 115,
5 are processed by processor 70 in a conventional manner to form an NTSC signal for display on NTSC compatible image reproduction device 75 e.g. a television or video monitor. Processor 70 may, in another embodiment, provide RGB output data for display by an RGB compatible reproduction device or a high definition television.

10 Controller 115, in conjunction with processor 55, forms an MPEG compatible datastream of compressed video and audio data containing the composite program guide and program content. Processor 55 separates system information including timing, error and synchronization information from the
15 datastream from unit 45 and diverts it for use by controller 115.

Controller 115 applies the system information in controlling processor 55 to provide re-synchronized, collated program and composite program guide data together with synchronization and error indication information for use in subsequent program
20 content data decompression by decoder 65. The composite program guide data provided by processor 55 combines the SPG, DPG and IPG data and User selectable options in a manner compatible with the program map linking information as previously described. The program content data provided by
25 processor 55 is decompressed by MPEG decoder 65 to provide video pixel data and audio output data to processor 70. Display processor 70 processes the video pixel data and audio output data to be suitable for reproduction by unit 75 as previously described.

Figure 2 shows an exemplary displayed composite
30 program guide. Menu features 833-850 show program services and functions. Menu features 833 and 835 show program channels which may be invoked and displayed upon highlighting of the corresponding menu feature using a User selection control such as a remote control directed cursor. If a User highlights feature 833
35 with the cursor, i.e. selects menu option 833, for example, processor 25 tunes to television channel 107 (A&E™) and displays

it on unit 75 using the composite non-displayed program guide information to determine the function activated and associated tuning information (channel frequencies etc.). Similarly, if a User highlights feature 837, processor 25 tunes to receive radio channel 5 FM 13 for audio output on unit 75. Upon highlighting features 840-850, corresponding to Email, telephone, fax and DVD record/playback functions respectively, additional function specific menus become displayed providing further User selection options. Such function specific menus may provide a User with the 10 ability to edit, store and delete access information including, for example, telephone numbers, Email addresses, Internet addresses, credit card numbers and additional conditional access data.

If a User highlights menu features 860-870 specific function tasks are initiated. Upon a User highlighting feature 860, 15 for example, a further menu is displayed prompting the User to enter an Email message to be sent to John Smith at his home via an Internet Email address retrieved from the composite non-displayed program guide information. Similarly, in response to a User highlighting feature 865, for example, controller 115 (Figure 20 1) retrieves Jean's home telephone number from internal memory using the composite non-displayed program guide information. Further, controller 115 establishes telephone communication, via modem 80, with Jean at her home by dialing Jean's home telephone number. Also, upon a User highlighting feature 870, for 25 example, the movie 'Star WarsTM' is re-played from DVD unit 90 (Figure 1). The communication between processor 25 and DVD unit 90 is established with access data retrieved from memory within controller 115 using the composite non-displayed program guide information.

30 In addition, the program guide may include one or more icons, such as icon 873 (Figure 2) depicting a home, for example, to indicate whether Internet information such as a 'home page' is available for a particular program. Further, icon 873, in Figure 2 may change color e.g. from white to green to indicate 35 Internet information is available for a particular program. Alternatively, icon 873 may be a pop-up icon which appears as an

indication that Internet information is available for a particular program. The displayed program guide may be formed to enable a User to request Internet information on a particular program by highlighting the program followed by highlighting the pop-up icon, 5 for example. Home page icons that are present when Internet information is available may also located within or adjacent to program icons, e.g. icon 859. Further, the home page icon may change color upon User selection of the information by highlighting the home page icon.

10 Although Internet information may be retrieved upon highlighting a web page icon such as icon 857, in Figure 2, this is exemplary only. Retrieval of Internet information may also be initiated in a variety of other ways. A user may retrieve available Internet information relating to a program, by highlighting a 15 program icon such as 'Seinfeld™' using icon 859 followed by highlighting Internet icon 810, for example.

Upon User selection of a composite program guide function, controller 115 (Figure 1) determines and applies the access data associated with both request and response operations 20 involved in the selected function. Controller 115 determines the access data required for the request and response operations from the previously formed non-displayed composite program map, conditional access and network information.

Processor 25 acquires information, such as web page 25 data, in response to a User request, in a number of ways, including, for example:

a) In a first configuration, processor 25 accesses web page data that is continuously transmitted in the satellite 30 broadcast received from decoder 30,

b) In a second configuration, processor 25 acquires web page data that is transmitted in the satellite broadcast received from decoder 30 in response to an information request to 35 a service provider via telephone line, and

c) In a third configuration, processor 25 both requests information and receives response information on the same communication link e.g. on the telephone link to server 83.

5 First configuration of Processor 25

In the first configuration, web page data selected by a User via the displayed program guide is continuously transmitted within the transport datastream input to processor 25 from decoder 30. In this configuration, the composite program map information contains predetermined PID values for the requested web page. Consequently, the requested web page data is retrieved from the input transport stream using the composite program map information without the need for controller 115 to communicate with a service provider via modem 80. In this configuration, the web information available to a User is limited to the specific information that a service provider continuously transmits to processor 25 using dedicated transmission bandwidth. However, this configuration is simple and offers quick web page access (since the web data may be stored locally at the encoder by the service provider). This configuration also minimizes the service provider burden of data acquisition and eliminates the need for processor 25 to communicate web page request information to a service provider.

The web page information, encoded in HTML™ and Java™, is packetized and formatted in an encoder by the service provider for incorporation into the MPEG transport datastream for transmission. Figure 3 shows a data format, according to the invention, for packetizing Internet data for transmission within an MPEG compatible datastream. A sequence of HTML™/Java™ web pages (705-720 of Figure 3) is formed by the encoder into non-compressed packets with ancillary information and HTML™/Java™ data (725). The ancillary information includes PID values, a packet count value, and individual web page size (e.g. number of bytes or image pixel size). The ancillary information may also include: a flag to indicate that a particular transport packet contains web

page information; a start code; a web page identification code; an error correction code and a timing parameter suitable for synchronizing web page Internet information with an associated video or audio program. The web page flag may be used to 5 facilitate identification and separation of the web page information from the MPEG compressed video data. Further, one or more elements of the web page ancillary data may be included within User definable elements of the MPEG transport syntax, such as within the transport header, or it may be included along with 10 the web page information in the MPEG transport data payload.

The response web page information, including a predetermined PID value, is incorporated in the MPEG compatible transport datastream input to processor 25 (Figure 1) by the service provider. The response channel predetermined PID value 15 is also prestored in controller 115 internal memory and incorporated in the composite program map information. As an alternative, the response data PID value and associated program map data may be encoded, for example, in a Channel Information Table (CIT) in a high definition television (HDTV) signal encoded 20 according to the *Digital Television Standard for HDTV Transmission* of April 12 1995, prepared by the United States Advanced Television Systems Committee (ATSC). In such a case, one or more specific pre-determined program channels may be designated to convey web page response information. Further, the 25 PID values of the program channels may be conveyed in a CIT in the composite program map information, for example.

Controller 115 derives the predetermined PID value corresponding to the requested web page response information from the stored composite program map information and loads it 30 into control registers within unit 45. Unit 45 matches the PIDs of incoming packets of web page response data in the transport datastream from decoder 30 with the PID value pre-loaded in the unit 45 control registers. The packets with PID values matching the pre-determined web-response PID value are identified as web 35 page response data and are provided by unit 45 to a dedicated

buffer in decoder 55. The dedicated buffer in transport decoder 55 holds response data to be decoded by processor 60.

Processor 55 derives system information including timing, error and synchronization information from the 5 datastream from unit 45 and provides it to controller 115. Controller 115 applies the system information in directing processor 55 to provide re-synchronized web page response data from the dedicated buffer in decoder 55 to HTML™/Java™ processor 60. Processor 60 decodes the HTML™ and Java™ encoded 10 web response information and provides web page image representative pixel data for storage in memory within controller 115. Although processor 60 is shown as a separate processor in Figure 1, it may also be implemented within the software of controller 115. Processor 60 comprises the processing functions of 15 a special web browser, including JPEG decompression and Java decoding such as involved in the operation of Netscape Navigator™, for example.

Program content data e.g. a User selected television program channel, within the MPEG compatible transport 20 datastream from decoder 30, is also decoded into pixel representative data by processor 25 in addition to the web page response data. For this purpose, controller 115 determines the PID value of the selected television channel program from the composite program map information and loads it into control 25 registers within unit 45. Unit 45 matches the PIDs of incoming packets of selected television channel program data in the transport datastream from decoder 30 with the PID value pre-loaded in the unit 45 control registers. The packets with PID values matching the pre-determined selected television channel 30 program PID value are identified and provided by unit 45 to a dedicated application buffer in decoder 55.

As previously described for the web page response data, processor 55 derives system information including timing, error and synchronization information from the datastream from 35 unit 45 and provides it to controller 115. Controller 115 applies the system information in directing processor 55 to provide re-

synchronized program channel content data from the application buffer in decoder 55 to MPEG decoder 65. The MPEG compatible program channel content data is decompressed by MPEG decoder 65 to provide video pixel data and audio output data to display processor 70. The video pixel data from decoder 65 is stored in a pixel representative memory contained in display processor 70.

Controller 115 retrieves the web page image pixel data from internal memory and formats it for storage as an overlay in the pixel representative memory contained in display processor 70. As such a merged display combining the web page response data and program channel content is formed within the pixel memory of processor 70. The relative proportions and sizes of the web page image and channel content image within the resultant composite image, formed in the processor 70 pixel memory, may 15 be varied by controller 115 in response to internal programmed instruction or external, e.g. User, command. The relative proportions may be varied so that either the web page image or channel content image contributes between 0-100% of the resultant composite image.

In order to adjust the proportion of the composite image contributed by the web page data, controller 115 scales the web page image pixel data by a conventional interpolation process. Alternatively, the data may be scaled by a separate video processing integrated circuit operating in conjunction with 20 controller 115. The resulting scaled web page image is stored within the processor 70 pixel memory by controller 115. The stored web page image represents an overlay image with respect to the program channel content image. In order to adjust the location of the web page image data within the composite image, 25 controller 115 determines the addresses corresponding to the desired memory locations from internal memory map data and stores the scaled web page image data at the desired memory locations. As previously explained, display processor 70 converts the formatted composite image data into conventional luminance 30 and chrominance components. Further, processor 70 processes the luminance and chrominance components, together with timing 35

data provided by controller 115, in a conventional manner to form an NTSC signal for display on NTSC compatible image reproduction device 75.

5 Second configuration of Processor 25

In the second configuration, processor 25 of Figure 1 acquires web page data that is transmitted in the satellite broadcast received from decoder 30 in response to an information 10 request to a service provider via a telephone line. Upon a User requesting web page data, e.g. by highlighting web page icon 857 in Figure 2, controller 115 (Figure 1) uses the request access data (telephone number, requested web page identifier code (e.g. URL) and conditional access data) to establish communication with the 15 satellite broadcast service provider.

Prior to establishing communication with the service provider, controller 115 determines from conditional access information whether access to the requested web page information is authorized. Authorization may be determined 20 directly from the program guide conditional access information or indirectly from a User entitlement device such as a smart card (not shown to simplify the drawing) within processor 25. If access is authorized, controller 115 establishes telephone communication with the satellite broadcast service provider by dialing a 25 telephone number via modem 80 and transmitting request information e.g. requested web page identifier code (such as a URL) and user entitlement code. The service provider incorporates the requested web page information in the transport datastream transmitted to processor 25 via antenna 10, processor 20 and 30 decoder 30. Controller 115 uses the response access data (PIPs of the web page data, response program channel number and transponder number) to identify and assemble the web page packets in the transport stream as described for the first configuration of processor 25.

35 The PID values of the response web page information and corresponding program map information may be

communicated between service provider and processor 25 in a variety of ways and in a variety of data formats. The PID values and program map information may be conveyed, for example, in accordance with proprietary or custom requirements of a 5 particular system such as within MPEG user definable data elements or within non-MPEG data such as within the vertical blanking interval (overscan region) of a broadcast television signal. Further, the PID values allotted to the web information may also be transmitted to processor 25 in supplemental program 10 guide information. As another alternative, the PID values to be used for response data may be determined by a service provider from information transmitted from processor 25.

Third configuration of Processor 25

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In a third configuration, processor 25 both requests information and receives response information on the same communication link e.g. on the telephone link to server 83 or connection service 87, via modem 80. In this configuration, 20 controller 115 requests Internet web page information by highlighting icon 857 (Figure 2), for example. Whereupon controller 115 (Figure 1) uses request access data (telephone number and URL code and conditional access data) to establish Internet access and request web page data at the URL address via 25 modem 80 and server 83. Controller 115 determines whether the requested Internet access is authorized from conditional access or smart card User entitlement information as described in connection with the second configuration of processor 25. If authorized, controller 115 establishes telephone communication 30 with a service provider via server 83 by dialing a telephone number using modem 80 and transmitting the Internet URL address code and user entitlement code, for example, as previously described. Controller 115 uses response access data (including Transmission Control Protocol/Internet Protocol 35 (TCP/IP) identification data) determined from the composite program map information to identify and assemble the web page

TCP/IP packets containing the web page HTML and associated JAVA data (and other data e.g. JPEG, GIF, TIF type data) in the response datastream from server 83.

The response web page TCP/IP packets are buffered
5 within modem 80 and provided to HTML™ processor 60 under command of controller 115. Processor 60 decodes the HTML™ and Java™ encoded web response information and provides web page image representative pixel data for storage in memory within controller 115. Controller 115 retrieves the web page image pixel
10 data from internal memory and formats it for storage as an overlay in the pixel representative memory contained in display processor 70 for reproduction by unit 75 as a merged display, as previously described. In this configuration, processor 25 supports full Internet access via server 83 using the displayed program
15 guide. For example, upon a User highlighting icon 810 followed by icon 830 (Figure 2) controller 115 (Figure 1) executes web page browser functions and displays either a custom web page browser or a standard browser display such as Netscape Navigator™ through which full Internet access is available.

20 Alternatively, in the third configuration, processor 25 may support a limited Internet service. In this case, access to the Internet network via server 83 is under the control of a service provider that allows only indirect Internet access. The service provider provides collated web page information for display
25 compatible with the displayed composite program guide. The service provider stores a limited number of web pages locally within server 83 that are accessible by processor 25 using the composite program map information which provides an index to the available web pages and their corresponding predetermined
30 PIDs. Alternatively, the service provider may alter the selection of web pages available from server 83 and periodically provide updated compatible supplemental program guide information to processor 25 via the satellite broadcast datastream.

The supplemental program guide information enables
35 processor 25 to form an updated displayed guide together with compatible program map and other access information enabling a

User to access the updated web information. By storing the web page Internet information locally in server 83 the service provider retains control of the Internet content available to a User and is able to bill the User for the material provided. Also, the 5 local storage of the web page information in server 83 provides a User with faster access to the information without the full delay associated with normal Internet access. Further, the burden on processor 25 of communicating information requests to external devices is minimized in that only a limited quantity of Internet 10 information may be requested and processor 25 need only communicate with local servers such as server 83. It is to be noted that modem 80 may also be a wide bandwidth communication modem such as a cable modem. In which case, processor 25 may decode both web page data and broadcast video program data for 15 display from a cable program source via modem 80.

Controller 115 employs the method shown in Figure 4 to produce a displayed program guide by processing and formatting received program guide information that already includes User selection menu options. The process of Figure 4 does 20 not require processor 25 to form User selection menu options and may be employed by processor 25 in its first configuration, for example. In step 205, following the start at step 200, processor 25 receives a transport datastream from decoder 30 that incorporates User selectable menu options for display as part of the displayed 25 program guide. The User selectable options support User initiation of communication functions such as Email, telephone, Internet access, fax, video-phone, channel tuning, program recording and home control functions.

The data received in step 205 also includes additional 30 linking data in the program guide information. The additional linking data comprises program map, conditional access and network information and associates access data with the User selectable menu options in the displayed program guide. The access data includes, identification codes, communication protocol 35 codes, conditional access codes, Internet access codes e.g. URL codes for web page and Email access as well as telephone and fax

numbers. The additional linking data enables processor 25 to assemble, decode and display the program content and program guide information in the transport stream from decoder 30. The access data enables processor 25 to communicate with external devices and includes different address representative codes corresponding to addresses of different information sources. In step 210, controller 115 uses predetermined linking data PID values stored in internal memory in directing processor 25 to identify and capture the linking and access data from the received program guide information. The captured linking data is assembled, formatted and stored by controller 115 in internal memory in step 215. Also, in step 210, additional linking data such as Internet or Email addresses or telephone numbers may be entered by a User via an entry device such as a remote control unit and the additional data is incorporated in the received linking data by controller 115.

The program guide information containing the User selectable options, is formatted for display by controller 115 in conjunction with display processor 70 within processor 25 in step 220, as previously described in connection with Figure 1. In step 225, display processor 70 converts the stored and formatted program guide data into conventional luminance and chrominance components. The luminance and chrominance components, together with timing data provided by controller 115, are processed by processor 70 for display on reproduction device 75. The process of Figure 4 terminates at step 230.

Controller 115 (Figure 1) employs the method shown in Figure 5 to produce a program guide in a video decoder from information received from a plurality of sources. The formed guide supports User selectable communication functions e.g. Internet access, Email, fax etc. . In step 305, following the start at step 300, controller 115 acquires satellite program guide (SPG) information from the satellite broadcast transport stream received by processor 25 from decoder 30. In step 310, controller 115 acquires DVD program guide (DPG) information from storage device 90 via interface 95. Controller 115 acquires, collates and

formats the SPG and DPG by accessing and assembling respective data packets to produce SPG and DPG representative pixel data for storage as a composite program guide in the unit 70 pixel map, as previously described in connection with Figure 1. The SPG and DPG
5 information includes linking and access data in the form of program map, conditional access and network information. In other configurations, processor 25 applies the principles detailed herein to form a composite program guide including program guide information derived from a source such as a terrestrial
10 broadcast source, a cable broadcast source, a computer source, a radio transmission source and a source accessed via telephone lines.

In step 315, controller 115 creates User selectable menu options for display (for User selection of Internet access,
15 Email, fax etc.) in pixel data form for incorporation in the unit 70 pixel memory map. In step 315, controller 115 also creates User determinable menu options that enable a User to customize his program guide to include an icon that performs a specific User requested function, for example, a User may require an icon that
20 accesses a specific Internet site or results in a display of all received messages. Controller 115 responds to commands entered via a data entry device e.g. a remote control unit or keyboard in creating the User determinable menu option in accordance with programmed instructions.

25 Controller 115, in step 320, examines the SPG and DPG information for data identifier (e.g. PID) omissions and conflicts. In step 325, controller 115 re-numbers existing data identifiers and allocates new data identifiers as required to produce compatible program map information for both the collated program guide
30 information and the associated program content. In step 330, controller 115 forms composite program map, conditional access and network information for the composite program guide in the manner described in connection with Figure 1.

The composite program map is formed to enable
35 processor 25 to perform the communication functions selectable via the composite program guide. For this purpose, the composite

program map associates a communication function PID and menu option (e.g. web page, Email, fax icon) with the different address representative codes corresponding to the addresses of the different information sources. In step 330, controller 115 also 5 incorporates User entered data into the composite program map, conditional access and network information. This data may include items such as an Email address, a telephone/fax number, an Internet web page link address, a credit card number etc. The User enters this data to processor 25 via a device such as a remote 10 control or keyboard. Controller 115, in step 335, formats the SPG and DPG pixel data together with the menu option pixel data in the unit 70 pixel map created in step 315 to form a composite program guide for display.

The composite program guide information containing 15 the User selectable menu options is formatted for display in step 340, and output in step 345 as previously described in connection with Figure 1. The process of Figure 5 terminates at step 350.

Controller 115 (Figure 1) employs the process of Figure 6 to automatically acquire and collate program guide information 20 from a plurality of sources to form a composite program guide for display. In step 405, following the start at step 400, controller 115 acquires and stores satellite program guide (SPG) information from the satellite broadcast transport stream received by processor 25 from decoder 30. Controller 115, in step 415, 25 automatically initiates communication with DVD storage device 90 (Figure 1), via interface 95. The communication is initiated upon power-up of processor 25 in response to pre-stored hardware configuration information defining the peripheral devices that are attached to processor 25 and the associated communication 30 protocols. This information may be contained within the received program guide information, or may be stored within processor 25 at manufacture, or may be determined locally by processor 25 or may be determined through a combination of these methods. The local determination of hardware configuration by processor 25 35 may be accomplished either by peripheral interrogation initiated

by controller 115, or by User data entry of hardware configuration data.

In alternative embodiments, communication may be automatically initiated upon conditions such as, a) User command via a program guide option selection, for example, b) peripheral interrogation initiated by controller 115 on a periodic or intermittent basis, or c) detection of a new or changed electrical connection of processor 25 to a peripheral device such as DVD device 90.

10 Controller 115 initiates communication with DVD unit 90 via interface 95 using communication protocol codes, identification codes, entitlement codes and conditional access codes retrieved from the access data within the received program guide information. In step 420, controller 115 directs processor 25
15 to acquire and assemble the DVD program guide (DPG) information derived from DVD storage device 90 via interface 95 in the manner previously described in connection with Figure 1. In step 425, controller 115 collates the SPG and DPG information by theme and topic by mapping the SPG and DPG information to
20 corresponding theme and topic categories in a master set, also as described in connection with Figure 1. Further, in step 425, controller 115 collates the SPG and DPG information by source and allocates a different color attribute to programs and program icons from different sources. In addition, controller 115 creates menu
25 options permitting a User to sort by source and color.

Figure 7 shows a black and white representation of a color Program Guide display format, according to the invention, showing menu options created by controller 115 permitting a User to collate programs by source and color attribute. Source icons 30 905-925 are associated with off-air broadcast, cable, radio, satellite and storage (e.g. DVD source 90 - Figure 1) respectively. Source icons 930-950 are associated with Email, telephone, videophone, fax and Internet function sources respectively. Upon a User highlighting source icon 905, for example, a program guide 35 is displayed showing off-air broadcast programs and associated icons. Similarly, upon a User highlighting source icon 930, for

example, a program guide is displayed showing Email icons via which a User may activate menus for initiating composition and sending of Email messages and reading and deleting of messages received.

5 Icon 900 is a "rainbow" sort icon showing a spectrum of discrete color blocks represented by shades of gray in the black and white program guide depiction of Figure 7. The color choices of icon 900 may alternatively be arranged as a continuous color spectrum or selected range of colors in a single or a number of
10 discrete color blocks. Upon a user highlighting a particular color within icon 900, programs from the source attributed with that particular color are displayed. For example, assuming in step 425 controller 115 attributes the color purple to the DVD source device 90, then upon a user highlighting the color purple within icon 900,
15 the movies available from DVD device 90 become displayed as a program guide. Alternatively, the color collation scheme may be used to identify programs by other criteria than source. Color may be used as an attribute to identify programs by theme or topic, for example, in which case a display of movies available for viewing
20 from all sources may be identified by highlighting a red color within icon 900, for example. In addition, program guide data may be collated by attributes other than color. For example, programs from different sources may be attributed with different types of shading or different icon shapes and geometrys.

25 Continuing with the process of Figure 6, in step 430, controller 115 forms a composite program guide for display from the collated SPG and DPG information in a manner similar to that described in connection with Figure 1. Controller 115 also, in step 425, creates associated User selectable menu options for display
30 including the User selectable program guide options for sorting by source and color. The created menu options are incorporated by controller 115 in step 430 in a composite program guide for display as exemplified in Figure 7. In step 435, controller 115 formats the composite program guide information for display as
35 previously described in connection with Figure 1. The process of Figure 6 terminates at step 440.

Controller 115 (Figure 1) employs the process of Figure 8 to acquire web page information requested by a video receiver User via a selection made from options on a displayed program guide. In step 505, following the start at step 500, controller 115 retrieves access data in the form of a telephone number and Internet URL code, for example, from memory in response to a User selection of a web page made via a displayed program guide. The access data associated with the particular User selection is determined from a program guide database using program map information that links all data associated with a particular program or program guide function.

In step 515, controller 115 directs processor 25 to establish a request communication link with server 83 by dialing the retrieved telephone number using modem 80. Also, in step 515, processor 25 encodes and transmits additional access data such as the Internet URL code using the protocol required for communication on the request communication link. The required protocol is determined from the program map information. In step 520, controller 115 directs processor 25 to receive and decode an input signal received on a response communication link. Controller 115 directs processor 25 in identifying and retrieving the response web page information from the input signal in steps 525 and 530. Different methods of retrieving response data from the input signal are employed by processor 25 in steps 525 and 530. The selected method depends on whether or not the response communication link is the same link used for the web page data request. The methods used in identifying and retrieving the response data are similar to those previously described in connection with the three configurations of processor 25. Controller 115 applies the appropriate configuration method in identifying the response web page data in the input signal, in step 525. For this purpose, controller 115 uses data identifiers determined from program map information that associates the identifiers with the User program guide selection. Controller 115, in step 535, formats the response web page information for display and the Figure 8 process ends at step 540.

Controller 115 (Figure 1) employs the process of Figure 9 for decoding both input Internet information and compressed video data to form a composite video output for display. Following the start at step 600, controller 115, in step 605, determines 5 packet identifiers for User requested Internet data and compressed image data from program map information. In step 607, controller 115 determines whether access to the compressed video data and the requested Internet data is authorized from conditional access or smart card User entitlement information as 10 previously described in connection with the third configuration of processor 25.

If access is authorized, controller 115, in step 610, identifies the web page TCP/IP packets containing the web page data in a response datastream from server 83. Similarly, if access 15 is authorized, controller 115, in step 615, identifies the compressed video data packets containing a User selected video program in an input transport stream from decoder 30 to processor 25. Controller 115 identifies the web page and compressed video data packets in a similar manner to that 20 described in connection with Figure 1.

In step 617, controller 115 directs processor 25 (Figure 1) to decrypt Internet or compressed video data if it is encrypted. Controller 115 in step 620, directs processor 25 in decoding the identified Internet web page data using HTML™ 25 processor 60. Controller 115 in step 625, directs processor 25 in decompressing the identified compressed video data using MPEG decoder 65. The resultant decoded web page data and decompressed video data is merged, formatted and displayed on unit 75 using display processor 70 under the direction of 30 controller 115 in step 630. The process of Figure 9 terminates at step 640.

The architecture of Figure 1 is not exclusive. Other architectures may be derived in accordance with the principles of the invention to accomplish the same objectives. Further, the 35 functions of the elements of processor 25 of Figure 1 and the process steps of Figures 4-6, 8 and 9 may be implemented in

30

whole or in part within the programmed instructions of a microprocessor. In addition, the principles of the invention apply to any form of MPEG or non-MPEG compatible electronic program guide. Further, the principles of the invention apply to 5 communication on any form of communication link including via cable, infra-red, radio, microwave, and via a computer network. In addition, it is to be noted that the formation of the composite program guide as described herein may be performed at a location remote from a video receiver and accessed by the receiver via a 10 communication network.

CLAIMS

1. In a video decoder system, a method for forming a
5 program guide allowing a User to select a function, comprising the
steps of:

a) receiving program guide information for display from
at least one source, said program guide information including User
selectable menu icons;

10 b) generating program map information in said decoder
for associating a User selectable menu icon with access data enabling
initiation of communication between said decoder and said external
device in response to selection of said menu icon presented in said
program guide information for display;

15 c) retrieving access data from memory, said access data
enabling initiation of communication between said decoder and a
device external to said video decoder in response to User selection of
said displayed program guide menu option; and

d) formatting said program guide for display.

20

2. A method according to claim 1, including the step of:

generating program map information for associating
different displayed User selectable menu icons with different
communication links.

25

3. A method according to claim 1, including the step of:

generating said program map information to further
associate said User selectable menu icon with said access data and a
data identifier for acquiring data from said external device.

30

4. A method according to claim 1, including the step of:
generating program map information for associating a
displayed User selectable menu icon with both request access data
5 and response access data for bi-directional communication.

5. A method according to claim 4, wherein
said request access data includes one of a) a telephone/fax
number, b) an Internet identifier or address code and c) conditional
10 access data; and

 said response access data includes at least one of a) a data
identifier, b) a channel number, and c) a transponder number.

6. A method according to claim 4, including the step of:
generating program map information for associating
different displayed User selectable menu icons with different address
representative codes corresponding to the addresses of information
sources.

20 7. A method according to claim 1, including the step of:
 generating program map information for associating
different displayed User selectable menu icons with different address
representative codes corresponding to the addresses of at least two
sources selected from: a) a storage source; b) a satellite broadcast
25 source; c) a terrestrial broadcast source; d) a cable broadcast source;
e) a computer source; f) a radio transmission source and g) a source
accessed via telephone lines.

8. A method according to claim 1, including the step of:
generating program map information for associating
different displayed User selectable menu icons with different
5 conditional access information for determining access to programs
based upon User entitlement.

9. A method according to claim 1, including the step of:
generating program map information for associating
10 different displayed User selectable menu icons with different physical
communication network parameters.

10. A method according to claim 1, including the step of:
deriving said access data from said received program
15 guide information.

11. A method according to claim 1, including the step of:
generating program map information for associating
different displayed User selectable menu icons with different address
20 representative codes corresponding to the addresses of information
sources provided to said decoder by a User.

12. A method according to claim 11, wherein
said address representative codes include at least one of
25 a) telephone/fax number representative information, and b) Internet
address representative information.

13. In a video decoder system, a method for forming a program guide allowing a User to select a function, comprising the steps of:

5 a) receiving program guide information from at least one source;

10 b) generating a menu icon for display in a displayed program guide, said menu icon permitting a User to initiate communication between said video decoder and a device external to
said video decoder;

15 c) generating program map information in said decoder for associating said menu icon with access data enabling establishment of bi-directional communication between said decoder and said external device in response to selection of said menu icon presented in said program guide information for display;

 d) incorporating program guide information and said menu icon in a program guide; and

 e) formatting said program guide for display.

20 14. A method according to claim 13, including the step of:
 deriving said access data from said program guide information.

25 15. A method according to claim 13, including the step of:
 generating program map information for associating different displayed User selectable menu icons with different communication links.

30 generating said program map information to further associate said menu icon with said access data and a data identifier for acquiring data from said external device.

16. A method according to claim 15, including the step of:
associating different access data with corresponding
different communication links.

5

17. A method according to claim 13, including the step of:
generating program map information for associating said
menu icon with both request access data and response access data.

10

18. A method according to claim 17, wherein
said request access data includes one of a) a telephone/fax
number, b) an Internet identifier or address code and c) conditional
access data; and

15 said response access data includes at least one of a) a data
identifier, b) a channel number, and c) a transponder number.

19. A method according to claim 17, including the step of:
generating program map information for associating
different displayed User selectable menu icons with different address

20 representative codes corresponding to the addresses of information
sources.

25 20. A method according to claim 13, including the step of:
generating program map information for associating
different displayed User selectable menu icons with different address
representative codes corresponding to the addresses of at least two
sources selected from: a) a storage source; b) a satellite broadcast
source; c) a terrestrial broadcast source; d) a cable broadcast source;
e) a computer source; f) a radio transmission source and g) a source
30 accessed via telephone lines.

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21. A method according to claim 13, including the step of:
generating program map information for associating
different displayed User selectable menu icons with different
5 conditional access information for determining access to programs
based upon User entitlement.
22. A method according to claim 13, including the step of:
generating program map information for associating
10 different displayed User selectable menu icons with different physical
communication network parameters.
23. A method according to claim 13, including the step of:
generating program map information for associating
15 different displayed User selectable menu icons with different address
representative codes corresponding to the addresses of information
sources provided to said decoder by a User.
24. A method according to claim 23, wherein
20 said address representative codes include at least one of
a) telephone/fax number representative information, and b) Internet
address representative information.
25. A method according to claim 13, including the step of:
25 generating program map information for associating
different packet identifiers (PIIDs) with program guide information
from different sources.

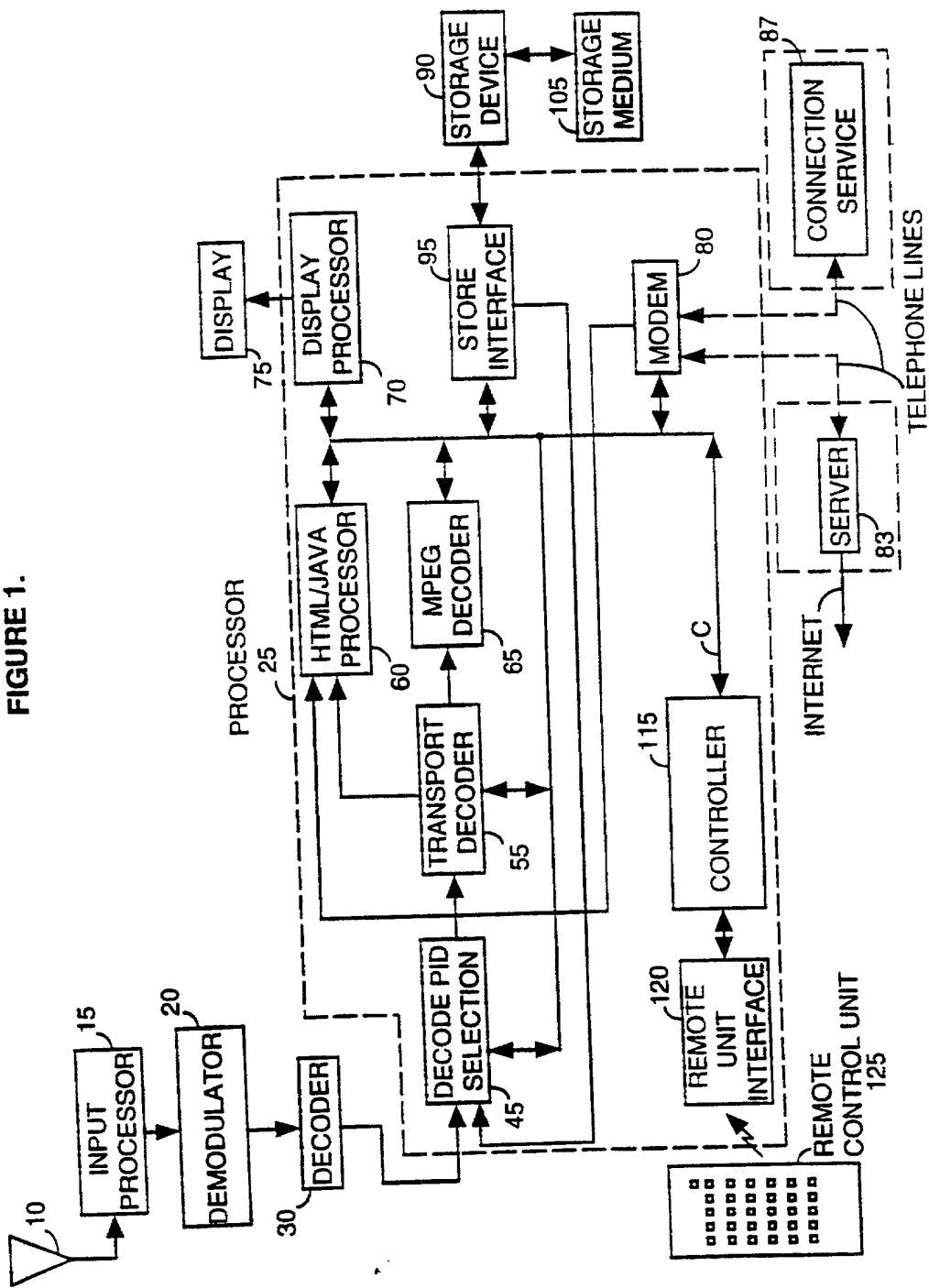
ANENDED SHEET

26. In a video decoder system, a method for forming a program guide allowing a User to select a function, comprising the steps of:

- 5 a) receiving program guide information from at least one source;
- b) generating a menu icon for display in a displayed program guide, said menu icon permitting a User to initiate communication between said video decoder and a device external to
10 said video decoder;
- c) generating program map information associating said menu icon with a communication protocol and both request access data and response access data enabling establishment of communication between said decoder and said external device in
15 response to selection of said menu icon presented in said program guide information for display;
- d) incorporating program guide information and said menu icon in a program guide; and
- e) formatting said program guide for display.

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FIGURE 1.



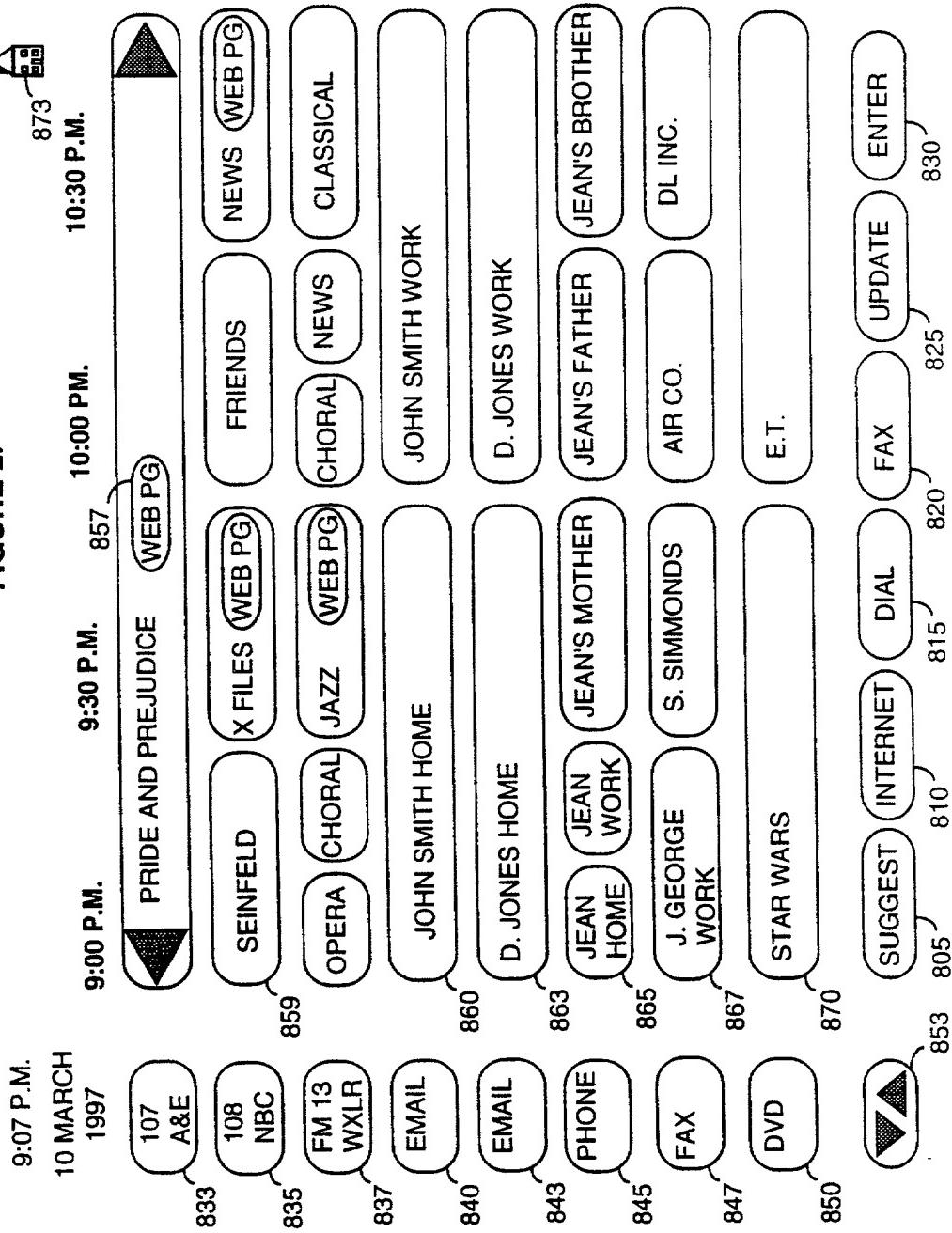
09/402498

WO 98/47284

PCT/US97/17033

2/9

FIGURE 2.



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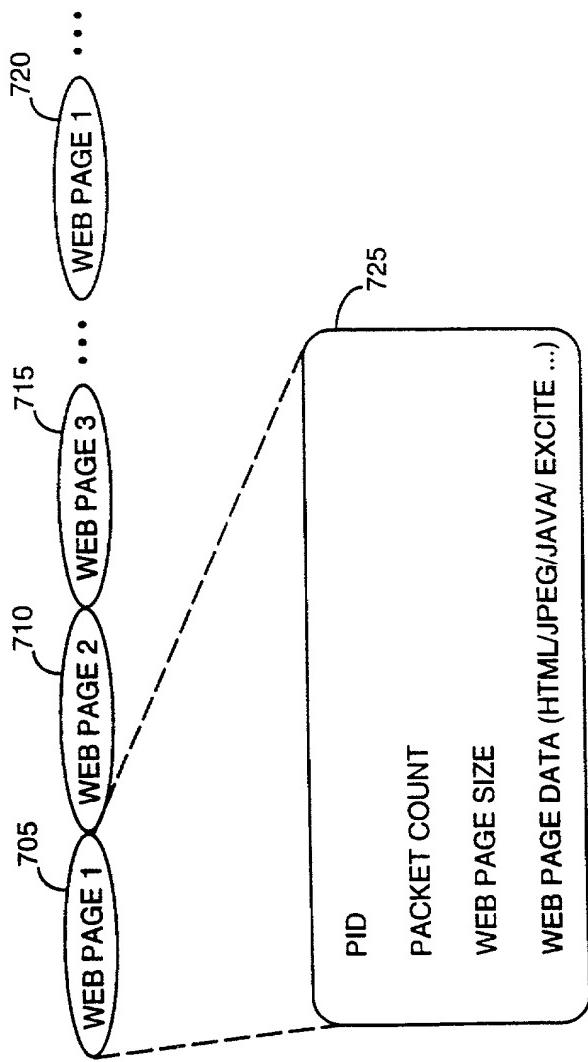
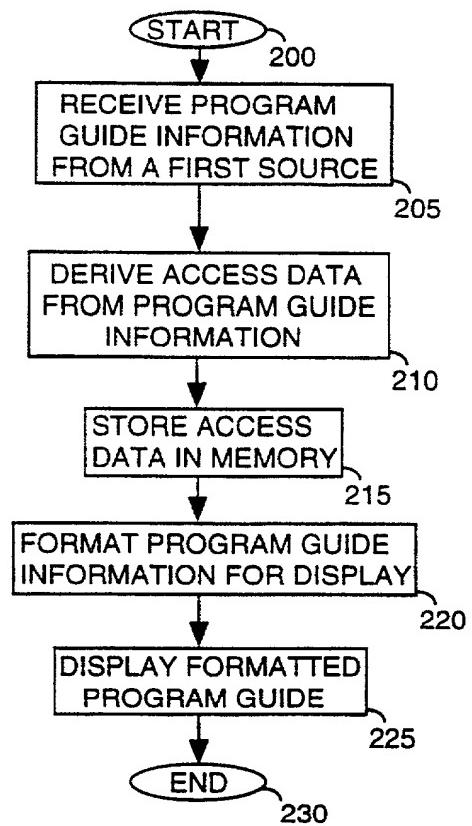
FIGURE 3

FIGURE 4

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5/9
FIGURE 5

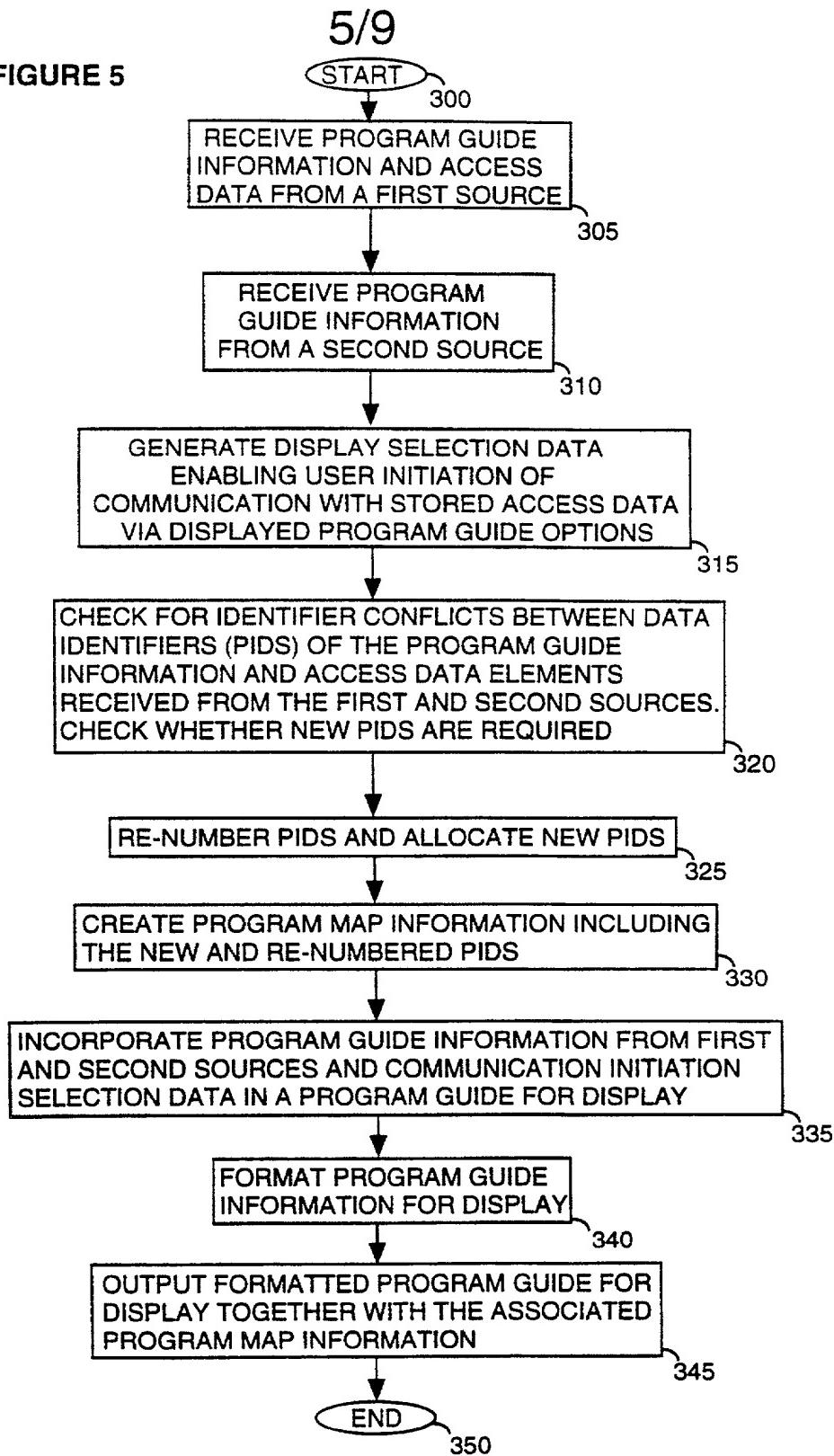
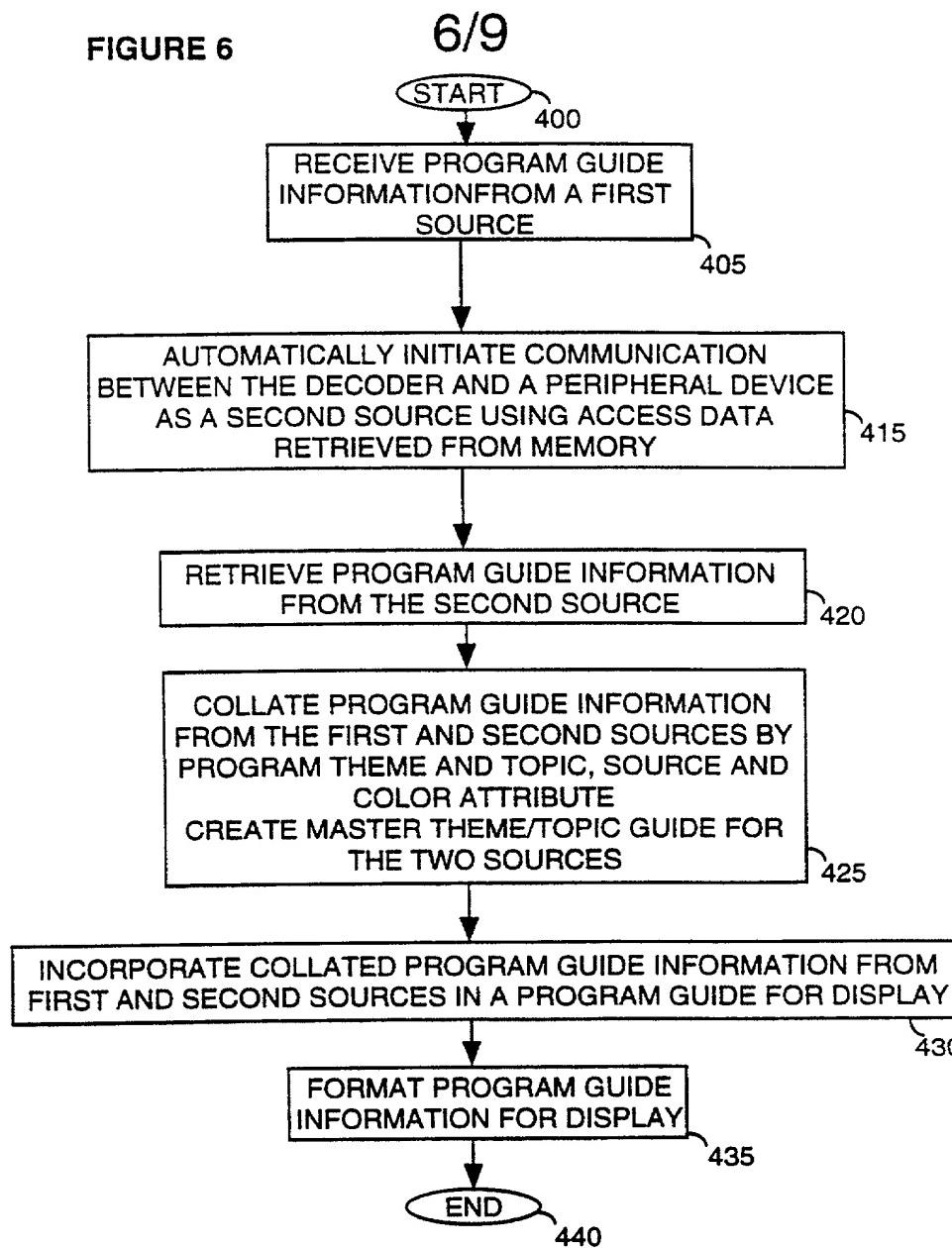
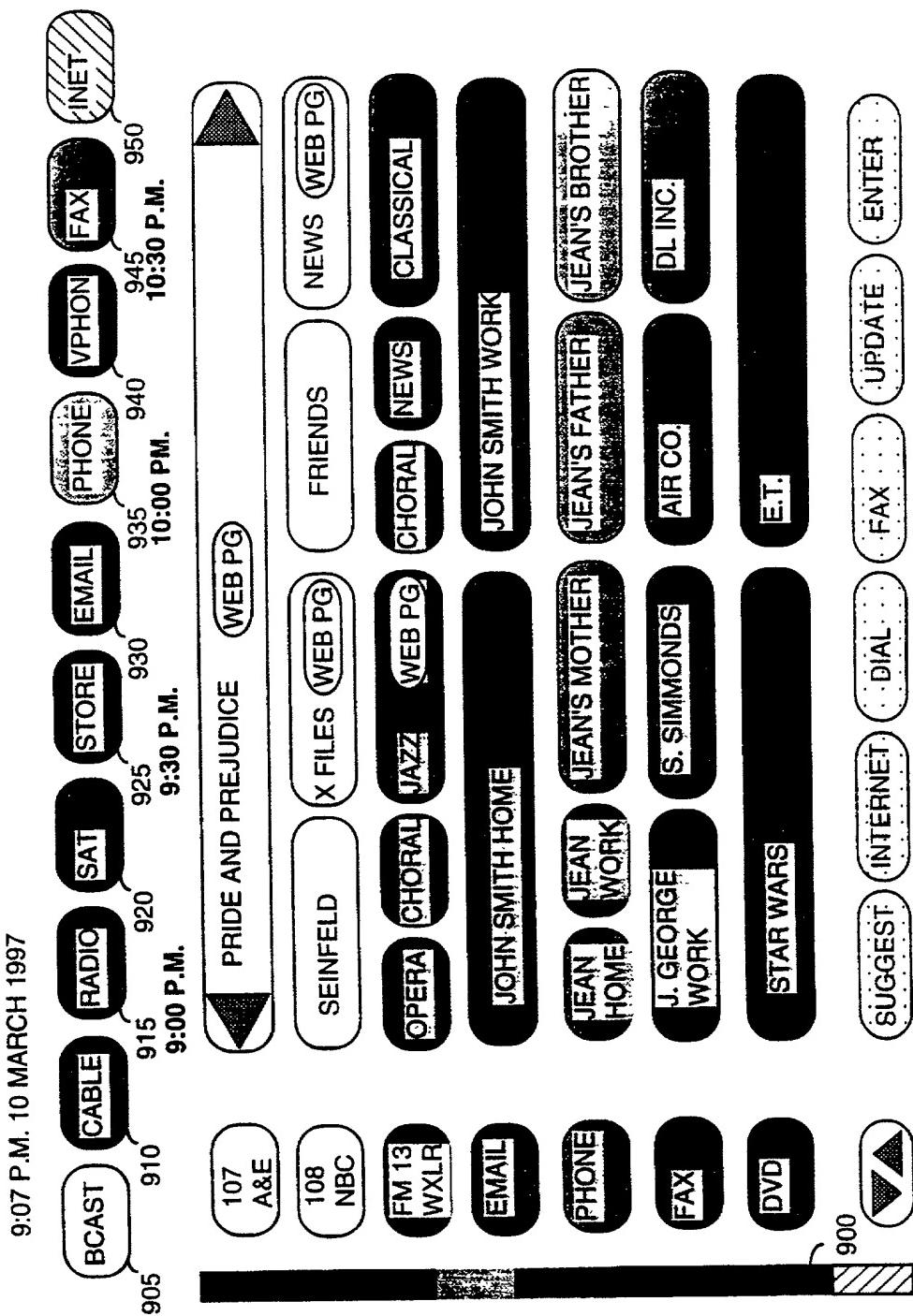


FIGURE 6

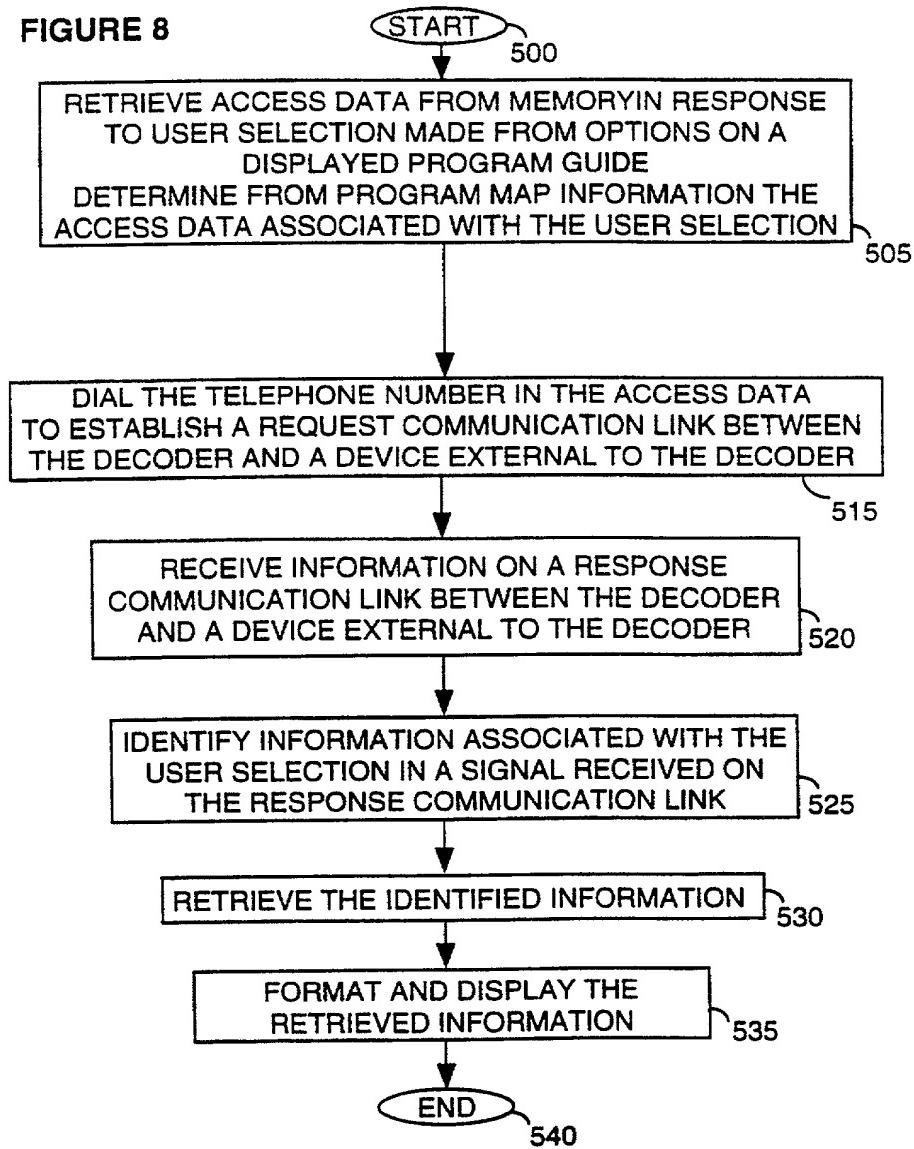


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FIGURE 7

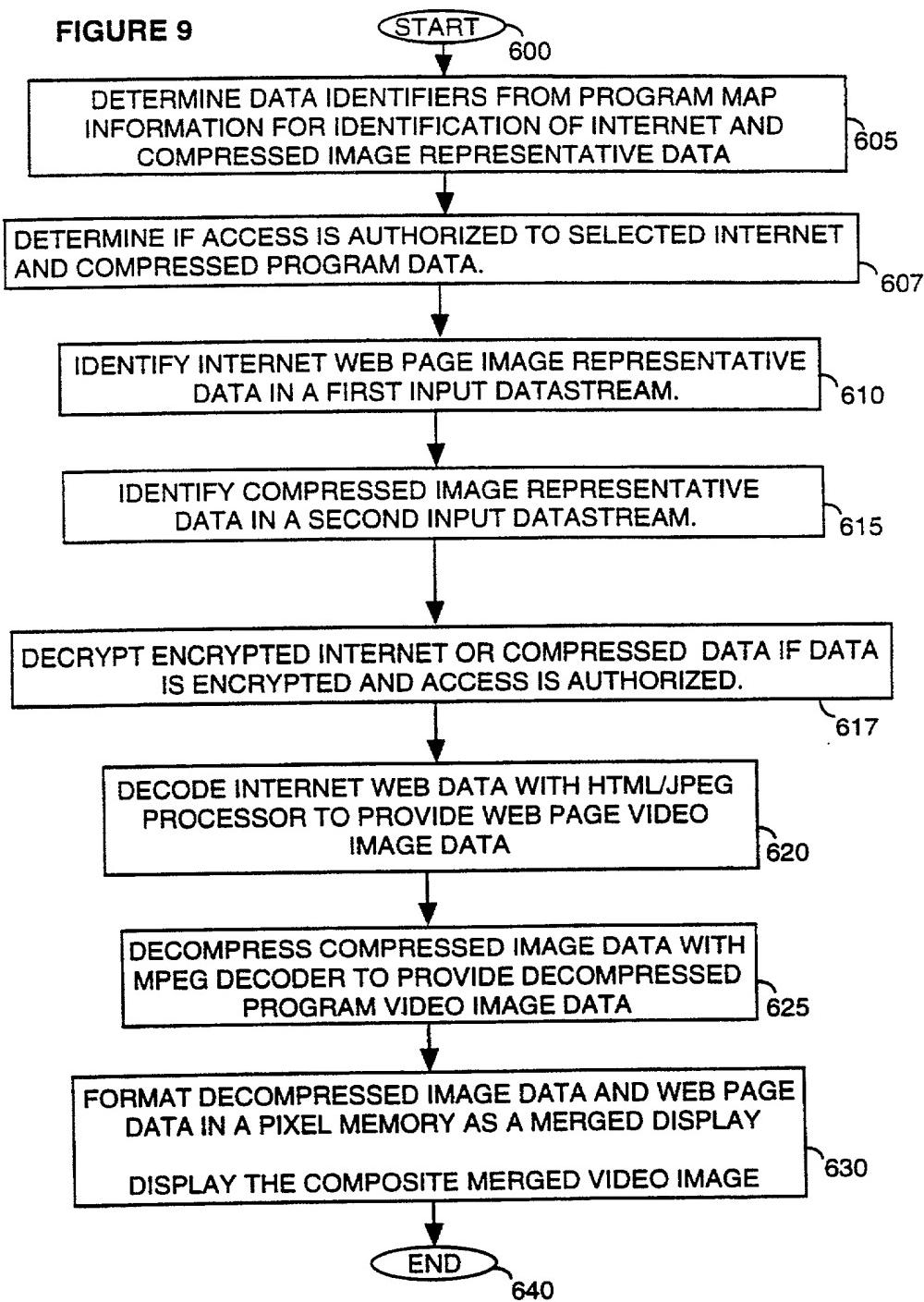


8/9

FIGURE 8

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FIGURE 9



COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER

RCA 88482

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SYSTEM FOR FORMING PROGRAM GUIDE INFORMATION FOR USER INITIATION OF
CONTROL AND COMMUNICATION FUNCTIONS

the specification of which (check only one item below):

- is attached hereto.
- was filed as United States application

Serial No. _____

on _____,

and was amended

on _____ (if applicable).

- was filed as PCT international application

Number PCT/US97/17033on 23 September 1997,and was amended under PCT Article 34on March 18, 1999 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY (if PCT, indicate 'PCT')	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

Combined Declaration For Patent Application and Power of Attorney (Continued)

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35 U.S.C. 120:

U S APPLICATIONS		STATUS (Check one)		
U S APPLICATION NUMBER	U S FILING DATE	PATENTED	PENDING	ABANDONED
60/043,539	14 April 1997			
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO	PCT FILING DATE	U S SERIAL NUMBERS ASSIGNED (if any)		
PCT/US97/17033	23 September 1997 (23.09.97)			

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number) Joseph S. Tripoli - Reg. No. 26,040

Joseph S. Tripoli	- Reg. No. 26,040
Eric P. Herrmann	- Reg. No. 29,169
Alexander J. Burke	- Reg. No. 40,425

Send Correspondence to: Joseph S. Tripoli - Patent Operations THOMSON multimedia Licensing Inc. PO Box 5312 Princeton, New Jersey 08540 US				Direct Telephone Calls to: <i>(name and telephone number)</i> 1-609-734-9503
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	RESIDENCE & CITIZENSHIP	CITY Indianapolis	STATE OR FOREIGN COUNTRY Indiana	COUNTRY OF CITIZENSHIP US
	POST OFFICE ADDRESS	POST OFFICE ADDRESS 7239 Creekside Lane	CITY Indianapolis	STATE & ZIP CODE/COUNTRY Indiana 46250 US
202	FULL NAME OF INVENTOR	FAMILY NAME JOHNSON	FIRST GIVEN NAME Michael	SECOND GIVEN NAME Wayne
	RESIDENCE & CITIZENSHIP	CITY Indianapolis	STATE OR FOREIGN COUNTRY Indiana	COUNTRY OF CITIZENSHIP US
	POST OFFICE ADDRESS	POST OFFICE ADDRESS 7316 Cobblestone West Drive	CITY Indianapolis	STATE & ZIP CODE/COUNTRY Indiana 46236 US
203	FULL NAME OF INVENTOR	FAMILY NAME MORRISON	FIRST GIVEN NAME Hugh	SECOND GIVEN NAME Boyd
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	POST OFFICE ADDRESS	POST OFFICE ADDRESS 7454 Galloway Avenue	CITY Indianapolis	STATE & ZIP CODE/COUNTRY Indiana 46250 US

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
James Edwin Hailey	Michael Wayne Johnson	Hugh Boyd Morrison
DATE 1999	DATE 1999	DATE 1999

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

(Includes Reference to PCT International Applications)

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U S APPLICATIONS

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Joseph S. Tripoli
Eric P. Herrmann
Alexander J. Burke

- Reg. No. 26,040
- Reg. No. 29,169
- Reg. No. 40,425

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1-609-734-9503

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SIGNATURE OF INVENTOR 201

James Edwin Hailey

DATE

1999

SIGNATURE OF INVENTOR 202

Michael Wayne Johnson

DATE

SIGNATURE OF INVENTOR 203

Hugh Boyd Morrison

DATE

1999

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Combined Declaration For Patent Application and Power of Attorney (Continued)

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31	Joseph S. Tripoli	- Reg. No. <u>26,040</u>
	Eric P. Herrmann	- Reg. No. <u>29,169</u>
	Alexander J. Burke	- Reg. No. <u>40,425</u>

<p>Send Correspondence to:</p> <p><u>Joseph S. Tripoli - Patent Operations</u> <u>THOMSON multimedia Licensing Inc.</u> <u>PO Box 5312</u> <u>Princeton, New Jersey 08540 US</u></p>				Direct Telephone Calls to: <i>(name and telephone number)</i>
				1-609-734-9503
201	FULL NAME OF INVENTOR	FAMILY NAME <u>HAILEY</u>	FIRST GIVEN NAME <u>James</u>	SECOND GIVEN NAME <u>Edwin</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Indianapolis</u>	STATE OR FOREIGN COUNTRY <u>Indiana IN</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>7239 Creekside Lane</u>	CITY <u>Indianapolis</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46250 US</u>
202	FULL NAME OF INVENTOR	FAMILY NAME <u>JOHNSON</u>	FIRST GIVEN NAME <u>Michael</u>	SECOND GIVEN NAME <u>Wayne</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Indianapolis</u>	STATE OR FOREIGN COUNTRY <u>Indiana IN</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>7316 Cobblestone West Drive</u>	CITY <u>Indianapolis</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46236 US</u>
203	FULL NAME OF INVENTOR	FAMILY NAME <u>MORRISON</u>	FIRST GIVEN NAME <u>Hugh</u>	SECOND GIVEN NAME <u>Boyd</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Indianapolis</u>	STATE OR FOREIGN COUNTRY <u>Indiana IN</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>7454 Galloway Avenue</u>	CITY <u>Indianapolis</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46250 US</u>

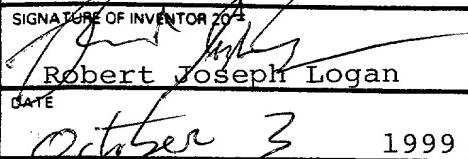
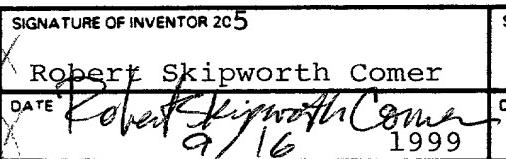
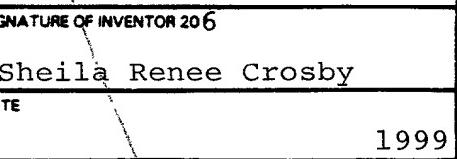
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
 James Edwin Hailey	 Michael Wayne Johnson	 Hugh Boyd Morrison
DATE 9/21 1999	DATE 9/22 1999	DATE 9/14 1999

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Continued)

204	FULL NAME OF INVENTOR	FAMILY NAME <u>LOGAN</u>	FIRST GIVEN NAME <u>Robert</u>	SECOND GIVEN NAME <u>Joseph</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Indianapolis</u>	STATE OR FOREIGN COUNTRY <u>Indiana</u> <u>IN.</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	7520 Prairie View Lane	CITY <u>Indianapolis</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46256 US</u>
205	FULL NAME OF INVENTOR	FAMILY NAME <u>COMER</u>	FIRST GIVEN NAME <u>Robert</u>	SECOND GIVEN NAME <u>Skipworth</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Carmel</u>	STATE OR FOREIGN COUNTRY <u>Indiana</u> <u>IN.</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	14 Shady Lane	CITY <u>Carmel</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46033 US</u>
206	FULL NAME OF INVENTOR	FAMILY NAME <u>CROSBY</u>	FIRST GIVEN NAME <u>Sheila</u>	SECOND GIVEN NAME <u>Renee</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Crystal Lake</u>	STATE OR FOREIGN COUNTRY <u>Illinois</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	325 Hampton Court	CITY <u>Crystal Lake</u>	STATE & ZIP CODE/COUNTRY <u>Illinois 60012 US</u>

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SIGNATURE OF INVENTOR 204	SIGNATURE OF INVENTOR 205	SIGNATURE OF INVENTOR 206
 Robert Joseph Logan	 Robert Skipworth Comer	 Sheila Renee Crosby
DATE <u>October 3</u> 1999	DATE <u>Robert Skipworth Comer</u> <u>9/16</u> 1999	DATE 1999

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Continued)

204	FULL NAME OF INVENTOR	FAMILY NAME <u>LOGAN</u>	FIRST GIVEN NAME <u>Robert</u>	SECOND GIVEN NAME <u>Joseph</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Indianapolis</u>	STATE OR FOREIGN COUNTRY <u>Indiana</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>7520 Prairie View Lane</u>	CITY <u>Indianapolis</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46256 US</u>
205	FULL NAME OF INVENTOR	FAMILY NAME <u>COMER</u>	FIRST GIVEN NAME <u>Robert</u>	SECOND GIVEN NAME <u>Skipworth</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Carmel</u>	STATE OR FOREIGN COUNTRY <u>Indiana</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>14 Shady Lane</u>	CITY <u>Carmel</u>	STATE & ZIP CODE/COUNTRY <u>Indiana 46033 US</u>
206	FULL NAME OF INVENTOR	FAMILY NAME <u>CROSBY</u>	FIRST GIVEN NAME <u>Sheila</u>	SECOND GIVEN NAME <u>Renee</u>
	RESIDENCE & CITIZENSHIP	CITY <u>Crystal Lake</u>	STATE OR FOREIGN COUNTRY <u>Illinois IL</u>	COUNTRY OF CITIZENSHIP <u>US</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>325 Hampton Court</u>	CITY <u>Crystal Lake</u>	STATE & ZIP CODE/COUNTRY <u>Illinois 60012 US</u>

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SIGNATURE OF INVENTOR 204	SIGNATURE OF INVENTOR 205	SIGNATURE OF INVENTOR 206
Robert Joseph Logan	Robert Skipworth Comer	<i>Sheila Renee Crosby</i> Sheila Renee Crosby
DATE 1999	DATE 1999	DATE 9/10 1999